

# Prevalence of bacterial illness in child presenting with first simple febrile seizure

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## Abstract

**Background:** Febrile convulsion is a most common convulsive disorder of childhood and comprising of frequent visits in emergency department. The issue of whether a well appearing child presenting with an FSFS is at increased risk for bacterial meningitis has remained controversial and if missed can lead fatal complications. **Aim:** To find out the prevalence of serious bacterial illness (SBI) in children presenting with first simple febrile seizure. **Material and Methods:** This prospective study was carried out in total 102 patients of between 6 months and 5 years of age group admitted with first simple febrile seizure (according to AAP criteria). **Results:** Out of 102 cases, 21 (20.6%) cases were attributed to bacterial in origin. On blood culture, 16 showed growth of bacteria. Out of which 8 (50%) were CONS, 6 (37.5%) *Streptococcus pneumoniae* and 2 (12.5%) were *Pseudomonas aeruginosa*. Hence, significant bacteremia was present in 8 (7.8%) cases and 75% cases were within two years of age. A total of 17 abnormal CSF was found and 4 cases showed organisms on Gram staining. All were Gram positive cocci. **Conclusion:** Children, especially under one-year age group and male gender, if they present with febrile seizures should be screened for probable presence of bacterial meningitis.

**Key Words:** Children, first simple febrile seizure, bacterial meningitis, lumbar puncture.

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AAP practice parameters recommended that lumbar puncture (LP) be strongly considered for patients <12 months of age and be considered for patients 12 to 18 months of age, in an effort to diagnose bacterial meningitis among children with FSFS as their sole clinical manifestation of infection.<sup>2</sup> The issue of whether a well appearing child presenting with an FSFS is at increased risk for bacterial meningitis has remained controversial and if missed can lead fatal complications. Our primary objective is to find out the prevalence of serious bacterial illness (SBI) in children presenting with first simple febrile seizure.

## INTRODUCTION

Febrile convulsion is a most common convulsive disorder of childhood with incidence of 5% and comprising of frequent visits in emergency department.<sup>1</sup> First simple febrile seizure (FSFS) was defined as a first episode of seizure accompanied by fever, manifested as a primary generalized seizure lasting  $\leq 15$  minutes and not recurring within 24 hours.<sup>2</sup> Probability of bacterial meningitis in children with fever with seizure varies from 0.6 to 6.7%.<sup>3</sup>

## MATERIAL AND METHODS

This prospective study was carried out in total 102 patients of between 6 months and 5 years of age group admitted with first simple febrile seizure (according to AAP criteria). AAP criteria for simple febrile seizures defined as neurologically healthy infants and children between 6 months and 5 years of age in a febrile child whose seizure is - self-limiting, short duration (<15

minutes), generalized tonic-clonic features, no recurrence within the next 24 hours and no post-ictal pathology.<sup>2</sup>

**Inclusion Criteria:** All admitted patients of age group between 6 months and 5 years, with first simple febrile seizure.

**Exclusion Criteria:** Children whose seizures were attributable to previous episode of simple febrile seizure, complex febrile seizure, previous afebrile seizure, history of Head injury, mentally retarded child and unconscious child. Clinical history was taken of precipitating factors like URTI, LRTI, AGE, UTI, Ear Infection etc., duration, type and frequency of convulsion. Family history of Febrile Seizure, Epilepsy. History of Birth Asphyxia / developmental delay. A detailed general and systemic examination was done in all cases to find out the foci of infection. The patients were evaluated, based on history, clinical examination and laboratory examinations to know the underlying cause of fever and presence of meningitis. Investigations undertaken were blood routine and blood culture, urine routine and urine culture, CSF study, blood glucose, serum electrolytes and chest X-ray, if needed.

## RESULTS

There were 32 (31.37%) cases between 6 to 12 months, majority being in 18-36 months. Males were 69 (68%) being the majority. There was positive history in 17 (16.7%) cases and in that 7 (6.8%) had family history of epilepsy and 10 (9.2%) had history of febrile convulsion in siblings.

**Table 1: Patient characteristics**

Characteristics	No. of cases	Percentage
<b>Age (months)</b>		
6-12	32	31.37%
12-18	17	16.66%
18-36	35	34.31%
>36	18	17.64%
<b>Sex</b>		
Male	69	68%
Female	33	32%
<b>Family history</b>		
Present	17	16.7%
Absent	85	83.3%

In our study, following were the causes for fever in descending order, URTI 27 (26.6%), fever without cause considered as viral fever 19 (18.7%), meningitis 17(16.8%), acute GE 10 (9.8%), UTI 9 (8.5%), LRTI 8 (7.8%), occult bacteremia (growth of organisms without identifiable source) 4 (3.9%), otitis media 4 (3.9%), others 4 (3.9%) which included 2 dengue, 1 malaria and 1 measles. Out of 102 cases, 21 (20.6%) cases were attributed to bacterial in origin and 81 (79.4%) were viral in origin. The cases in which there was no evidence of bacteria on culture, gram stain or pus cells on microscopy

were considered viral. All the cases were sent for blood culture, out of 102 samples, 16 showed growth of bacteria. Out of which 8 (50%) were CONS (which were excluded as contaminants), 6 (37.5%) *Streptococcus pneumoniae* and 2 (12.5%) were *Pseudomonas aeruginosa*. Hence, significant bacteraemia was present in 8 (7.8%) cases and 75% cases were within two years of age.

**Table 2: Organisms isolated from blood culture**

Type of organisms	Number	Percentage
Coagulase Negative Staphylococci (CONS)	8	50%
<i>Strepto. pneumoniae</i>	6	37.5%
<i>Pseudomonas aeruginosa</i>	2	12.5%

In 8 positive cultures, 2 were associated with pyogenic meningitis, one with otitis media and one with pneumonia. The cases where source of infections could not be identified were considered as occult bacteraemia. Out of 4 (3.9%), 3 were below 12 months and one was below 18 months. All the 102 cases underwent lumbar puncture and CSF examination was done. A total of 17 abnormal CSF was found, in that all showed increased cell count depending on type of meningitis along with that, only protein was elevated in 9 cases, 5 had only low sugar compared to RBS and protein and sugar were abnormal in 3 cases. Out of 17, 4 cases showed organisms on Gram Staining. All were Gram positive cocci.

**Table 3: Growth According To Organisms Isolated**

Organisms	Number of isolates	Percentage
<i>Strepto. pneumoniae</i>	3	75%
<i>E. coli</i>	1	25%
<i>H. influenzae</i>	0	0%

Out of 102 cases, 4 (3.9%) cases showed growth of organisms among these 3 were *Streptococcus pneumoniae*, one was *E. coli* and none grew meningococci or *H. influenzae*. Out of 17 meningitis cases, 11 were viral, 6 were pyogenic and one was tubercular in nature.

## DISCUSSION

In the present study the majority of cases were seen in the age group of 12-36 months. Incidence of infection is also more in this age group because of immaturity of the immunological function. As the age increases the incidence of febrile convulsions were less which can be explained by the fact that maturity and myelination of brain progressively increases. Our study is comparable to other studies such as Shah *et al*<sup>4</sup> and Millar JS,<sup>5</sup> which also shows peak incidence around 2 years of age. The family history of convulsions was present in 17 children (16.7%) of which 10 (9.8%) had family history of febrile convulsions and 7 (6.8%) had family history of epilepsy. The risk of child developing epilepsy at a later age is

more with a family history of afebrile convulsions. Family history has a definite role in determining whether children have FS recurrences and subsequently develop afebrile seizures.<sup>6,7</sup> Twenty-five to 40% of patients showed a positive family history for FS; the incidence of FS being 20.7% among siblings, 10.9% among parents, and 14.1% among first-degree relatives of probands.<sup>7</sup> The high frequency of affection of siblings and parents suggest the hereditary nature of the disease. Those children who had a possible family history of afebrile seizures need to be followed up and evaluated more closely in future, based on these evidences. In our study, out of 102 cases, 16 showed growth of bacteria. In that, 8 were CONS (which were excluded considering them as contaminants). Hence, 8 (7.8%) showed growth of bacteria, 2 *Pseudo. aeruginosa* and 6 *Strepto. pneumoniae*. Four bacteremia were found with identifiable focus, 2 meningitis, 1 otitis media and 1 with UTI. Other 4 (3.9%) were occult sepsis. Out of 8 (7.8%) positive cultures, 6 (5.85%) were Streptococci and 2 (1.95%) are Pseudomonas. In that, causes for occult sepsis are, 3 Streptococcus and 1 Pseudomonas. Among 8 cases, 6 (75%) cases were within 2 years and only 2 are more than 2 years. All the cases of occult sepsis were within 2 years, most being below 1 year. Febrile seizures are the single most common seizure type and occur in 2 to 5% of children younger than age 5 years with a peak incidence in the second year of life. In our study also, all the cases of pyogenic meningitis were within 2 years of age, that too 5 (84%) being within 1 year and 1 (26%) between 12-28 months. The higher rate of meningitis in less than 2 years of age can be explained by the fact that, signs of meningeal irritation are subtle in these age groups and even when present, it is difficult to pick them up which again varies from clinician to clinician depending on their experience and clinical skills. Though viral infections comprise majority of causes, occult bacteremia should be thought of and ruled out in all the cases of febrile convulsions, as they comprise small but significant number, especially in age group of below 2 years. In our study, out of 102 cases, 17 (16.7%) were diagnosed as meningitis depending on CSF picture, among that 6 (35.3%) were pyogenic, 11 (64.7%) viral and 1 (6%) had tubercular meningitis. Out of 6 pyogenic, 4 showed positive cultures, 3 streptococci, 1 *E. coli*. All the pyogenic meningitis cases were within 18 months, 84% being within 1 year of age. In a study by Seltz *et al*,

LP was performed in 146 (37%) of 336 CFS cases and six cases of *Streptococcus pneumoniae* meningitis were detected.<sup>8</sup> Kimia *et al* performed LP in 64% of 526 CFS cases in the 6-60 months age group and detected two bacterial meningitis cases in patients with obviously abnormal neurological symptoms.<sup>9</sup> The current study has some strength which is related to its topic. Though meningitis in children is a very critical problem only few published studies are available on this topic. Our study has some implications, especially the under one-year age group and male gender are crucial findings of our study and these will definitely help pediatricians in giving special care to these children if they present with febrile seizures and screen them for probable presence of bacterial meningitis. There were some limitations of the current study. This was an observational trial which looked at the clinical and pathological status once and did not follow up patients for longer duration. However, if it would have been done the picture might have been clearer.

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